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R/016/62/007/005/003/003  
A026/A126

AUTHOR: Librescu, Liviu

TITLE: On the problem of non-linear flutter of non-homogeneous thin cylindrical structures

PERIODICAL: Académie de la République Roumaine.. Revue de Mécanique Appliquée,  
v. 7, no. 5, 1962, 927 - 945

TEXT: In rocket and space-craft construction novel materials are used more and more. They are assimilated with homogeneous and elastically orthotropic materials. Consequently, it is very important to examine the aero-elastic stability of the structures built with similar materials. In subject paper the author discusses the problem of non-linear flutter of thin cylindrical panels, obtained by arbitrary superposition of elastically orthotropic layers. It is assumed that the high supersonic-speed fluid current passes with  $M \geq 2$  only along one surface of the panel, whose other surface is placed in tranquil air. The non-disturbed speed vector of the current runs parallel to the axis  $O\alpha$  (Fig. 1). The following hypotheses are adopted: a) The layers constituting the structure

Card 1/2

LIBRESCU, Liviu

Nonlinear fluttering of nonhomogenous, thin, and cylindrical structures. Studii cerc nec apl 13 nr.3:681-700 '62.

LIBRESCU, L.

"Problems of the mechanics of continuous medium," dedicated to  
the 70th anniversary of the birth of Academician N.I.  
Mushkhemishvili. Reviewed by L.Librescu. Studii cerc mec apl  
13 no.3:799-801 '62.

LIBRESCU, L.

Aeroelastic stability of the nonhomogeneous thin structures in  
a supersonic fluid current. Comunicarile AR 12 no.7:815-823  
Jl '62.

1. Comunicare prezentata de academician E.Carafoli.

LIBRESCU, L.

Vibrations and the aeroelastic stability of the thin,  
nonhomogeneous cylindrical structures in a current of compressible fluid. Studii cerc nec apl 13 no.4:911-933 '62.

L 18294-63

EPA(b)/ENR(r)/ENT(l)/ENT(m)/BDS

AFTTC/ASD Pd-4 EM

ACCESSION NR: AP3001844

R/0016/63/008/002/0251/0276

61

AUTHOR: Librescu, LiviuTITLE: Vibrations and aero-elastic stability of cylindrical heterogeneous structures in a compressible fluid flow

SOURCE: Revue de mecanique appliquee, v. 8, no. 2, 1963, 251-276

TOPIC TAGS: layer structure, deformation, displacement, movement equation, compatibility equation, physical equation, vibration, circular cylindrical structure, compressible fluid flow

ABSTRACT: The author develops equations on elasticity of layer structures. He presents mathematical geometrical relationships between deformations and displacements. After presenting compatibility equations, equations of movement and physical equations he develops resolving equations from which final solutions may be obtained. Vibration and stability of circular cylindrical structures in a compressible fluid flow are analyzed. The effect of rotating inertial forces on critical velocity of the flutter is also discussed. The accompanying tables give mathematical expressions for mechanical parameters for structures made of orthotropic layers when they are symmetrical or isotropic. Orig. art. has: 57 formulas, 2 figures

Card 1/2

LIBRESKU, L.I. [Librescu, L.I.] (Bukharest).

Theory of anisotropic elastic shells and plates. Inzh.zhur. 4 no.3&4/75-  
485 '64. (MIRA 17:10)

Librescu, S.

RUMANIA / Microbiology. Microbes. Pathogenic to Man and F-5  
Animals. Bacteria. Bacteria of the Intestinal  
Group.

Abs Jour: Ref Zhur-Biol., No 16, 1958, 72123.

Author: Nestorescu, N.; Popovici, M.; Novac, S.; Librescu,  
S.; Cheptea, A. Nestorescu, N.; Popovici, M.;  
Librescu, S.; Novak, S.; Cheptea, A. Gorun, V.

Inst: Not given.

Title: Investigation of Spread in Rumania of Serological  
Types of Intestinal Bacillus Causing Enteritis  
in Children.

Orig Pub: Rev. microbiol. parazitol. si epidemiol., 1956,  
1, No 2, 46-49; 49-53, 1, 4, 7, 10.

Abstract: The feces of 225 healthy children from 5 collect-  
ives and of 300 children with enteritis were  
studied. 13 strains of pathogenic serotypes of

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42

Librescu, S.

RUMANIA / Microbiology. Microbes Pathogenic to Man and F-5  
Animals. Bacteria. Bacteria of the Intestinal  
Group.

Abs Jour: Ref Zhur-Biol., No 16, 1958, 72124.

Author : Nestorescu, N.; Popovici, M.; Novac, S.; Librescu,  
S.; Cheptea, A.

Inst : Not given.

Title : Study of the Spread In Rumania of Serological  
Types of Intestinal Bacillus Causing Enteritis  
in Children.

Orig Pub: Rev. microbiol., parazitol. si epidemiol., 1956,  
1, No 2, 53-57.

Abstract: In Rumania, serological types of intestinal  
bacillus which play an important role in the  
etiology of enteritis in children, especially in  
the appearance of a toxic-septic epidemic syndrome,

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ACCESSION NR: AP4043521

S/0258/64/004/003/0475/0485

AUTHOR: Libresku, L. I. (Bucharest)

TITLE: Theory of anisotropic elastic shells and plates

SOURCE: Inzhenernyy zhurnal, v. 4, no. 3, 1964, 475-485

TOPIC TAG: -stic shell, elastic plate, stress analysis, Gaussian equation

ABSTRACT: A theory is presented for homogeneous anisotropic elastic shells and plates which is free from simplifying hypotheses. Components  $e_{ij}$  of the deformation tensor and components  $\sigma_{ij}^3$  ( $i = 1, 2, 3$ ) of the stress tensor were considered. The boundary conditions at the external surfaces of the shell were strictly satisfied, and no limitation to the thickness of the shell was imposed. The shell (constant thickness  $h$ ) was described by a radius vector using Gaussian coordinates. Covariant and contravariant components of the 3-dimensional metric tensor of the middle layer of the shell were dealt with, and the Gaussian curve of the undeformed surface was expressed. Christoffel's symbols of the second kind were used and the Gauss-Kordats equations were considered. Elemental volumes of the middle surface were studied in the absence of massive forces. The general relation between stresses and small

Card 1/2

LIBREYKH, G. Ya.

Libreykh, G. Ya. "Materials for research on the physico-chemical properties of the feces of healthy and sick horses," Trudy Alma-At. vet.-zootekhn, in-ta, Vol. V, 1948, p. 214-22 -- Bibliog: 28 items

So: U-3566, 15 March 53, (Letcpis 'Zhurnal 'nykh Statey, No. 13, 1949)

LIBREYKH, G. Ya.

USSR/Diseases of Farm Animals - Noncontagious Diseases.

R-1

Abs Jour: Ref Zhur-Biol., No 12, 1958, 54898.

Author : Libreykh, G. Ya.  
Inst : Alma-Ata Institute of Zoology and Veterinary  
Sciences.  
Title : Data on the Pathogenesis of Gastro-Intestinal  
Disturbances in Horses with Pathological Changes of  
the Cardiovascular System.

Orig Pub: Tr. Alma-Atinsk. zoovet. in-ta, 1956, 9, 139-144.

Abstract: Diseases of the cardiovascular system (myodegeneration, myocarditis, heart failure), often found in horses employed in mountainous areas, are an important factor in the development of gastro-intestinal disturbances. Heart diseases cause a weakening of

Card : 1/3

USSR/Diseases of Farm Animals - Noncontagious Diseases.

R-1

Abs Jour: Ref Zhur-Biol., No 12, 1958, 54898.

heart muscle contractions, resulting in hemodynamic disturbances, which in turn cause a slowing of blood flow, a decrease in blood supply to all tissues, and, consequently, a decrease of their being supplied with oxygen. The insufficient flow of oxygen to the tissues causes disturbances of their biochemical processes and of the body's metabolism. This oxygen insufficiency causes changes and disturbances in all parenchymatous organs, particularly functional disturbances of the gastro-intestinal tract. Examination of 53 sick horses who showed clinical symptoms of heart disease and of lung impairment in some of the cases as well, revealed in all of the animals pathological changes of the gastro-intestinal tracts. Gastritis is the chief form of stomach pathology,

Card : 2/3

USSR/Diseases of Farm Animals - Noncontagious Diseases.

R-1

Abs Jour: Ref Zhur-Biol., No 12, 1958, 54898

which presents hyperacidic characteristics in the  
early stages of the disease. Basically, the gastritis  
process is a chronic one.

Card : 3/3

LIBREYKH, G.Ya., dotsent

Materials on the pathogenesis of stomach and intestinal diseases in horses with a pathology of the cardiovascular system. Trudy AZVI 9:139-144 '56.  
(MIRA 15:4)

1. Iz kafedry chastnoy patologii i terapii (zav. kafedroy - chlen-korrespondent AN KazSSR, zasluzhennyy deyatel' nauki KazSSR, doktor prof. Ya.I.Kleynbok) Alma-Atinskogo zooveterinarnogo instituta.  
(Horses--Diseases and pests) (Alimentary canal--Diseases)

"APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R000929820

LIBREIKH, G. Ya.

KLEINBUK, Ia. I., Prof., Dr. of Vet. Sci., LIBREIKH, G. Ya., Lect.  
Alma-Ata Zooveterinary Inst.

"Diathermal test of pain in traumatic reticulitis of cattle."  
SO: Vet. 24 (2) 1947, p. 43

APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R000929820C

LIBROVICH, B. G., ed.

Operation of Combustion engines and their aggregates; collection of articles  
dedicated to the memory of E. K. Mazing  
Moskva, Mashgiz, 1946. 251 p.

*L 113 ACHIEV, 13.6.*

ORLIN, Andrey Sergeyevich; prof.; VYRUBOV, Dmitriy Nikolayevich; KALISH, German Georgiyevich; KRUGLOV, Mikhail Goeorgiyevich; LEONOV, Oleg Borisovich; LEBEDEV, Sergey Yevgen'yevich; LIBROVICH, Branislav Genrikhovich; CHURSIN, Mikhail Mikhaylovich; MEL'KUMOV, T.M., prof., retsenzent; YEGORKINA, L.I., inzh., red.; TIKHANOV, A.Ya., tekhn.red.

[Internal combustion engines] Dvigateli vnutrennego sgorania. Pod red. A.S.Orlina. Izd. 2-oe, perer. i dop. Moskva, Gos. nauchno-tekhn.izd-vo mashinostroit. lit-ry. Vol.1. [The working principles of engines and their units] Rabochie protsessy v dvigateliakh i ikh agregatakh. 1957. 396 p. (MIRA 11:3)

(Gas and oil engines)

LIBROVICH, L. S.

The Carboniferous of the Schartym River and the Upper Ural region. Leningrad, GONTI.  
1939. 41 p. map. (Trudy, Tsent. nauchno-issled. geol.-raz. inst. vyp. 114)  
PPAN

LIB/REVIEW, END

NEKHOROSHEV, V.P.; ORLOV, Yu.A., glavnnyy redaktor izdaniya; SHUL'GA-NESTREMKO,  
M.I., redaktor; MALIVKIN, D.V., redaktor; GKKER, R.F., redaktor;  
KRISHTOFOVICH, A.N., redaktor; LIPOVICH, L.S., redaktor; LIKHAREV, B.K.,  
redaktor; SLODKOVICH, V.S., redaktor; MEREZIN, A.G., redaktor; YANI-  
SHEVSKIY, M.E., redaktor; MERKLIN, R.J., redaktor; AUZAN, N.P.,  
tekhnicheskiy redaktor

[Paleontology of the U.S.S.R.] Paleontologiya SSSR. Moskva, Izd-vo  
Akad.nauk SSSR. Vol.3, pt.2, no.1. Nekhoroshev, V.P. [Devonian Bryozoa  
of the Altai Territory] Devonskie mshanki Altaia. 1948. 172 p.  
48 p. of illus. (MIRA 10:7)

1. Direktor Paleontologicheskogo instituta (for Orlov)  
(Altai Territory--Polysca, Fossil)

LIRROVICH, L. S.

Geology, Stratigraphic

Paleontological method in stratigraphic geology. Mat. Geol. inst., 5, 1948

MONTHLY LIST OF RUSSIAN ACCESSIONS. Library of Congress, October 1952. UNCLASSIFIED.

GRUSHEVOY, V.G.; IVANOV, A.A.; KUREK, N.N.; LIBROVICH, L.S.; MOROZENKO,  
N.K.; NEKHOROSHEV, V.P.; HUSANOV, B.S.; SHABAROV, N.V.; SEMENOVA,  
M.V., red.izd-va; GORDIYENKO, Ye.B., tekhn.red.

[Instructions and conventional symbols for making mineral map  
of the U.S.S.R. on a 1:1000000 scale] Instruktsia i uslovaye  
oboznacheniia dlia sostavleniia karty poleznykh iskopaemykh  
SSSR masshtaba 1:1000000. Moskva, Gos.nauchno-tekhn.izd-vo  
lit-ry po geol. i okhrane nedr, 1955. 16 p. (MIRA 12:10)

1. Leningrad, Vsesoyuznyy geologicheskiy institut.  
(Mines and mineral resources--Maps)

BOCH, S.G.; GRUSHEVOY, V.G.; DZEVANOVSKIY, Yu.K.; ZORICHIEVA, A.I., IVANOV, A.A.; KUREK, N.N.; LIBROVICH, L.S.; MOROZENKO, N.K.; NEKHOROSHEV, V.P.; RUSANOV, B.S.; SPIZHANSKIY, T.N.; SHABAROV, N.V.; SHATALOV, Ye.T., redaktor; DZEVANOVSKIY, Yu.K.; redaktor; KRASNIKOV, V.I., redaktor; MIRLIN, G.A., redaktor; RUSANOV, B.S., redaktor; SEMENOVA, M.V., redaktor; GUROVA, O.A., tekhnicheskij redaktor.

[Instruction for compiling and preparing for publication the state geological map of the U.S.S.R., and the map of the mineral resources of the U.S.S.R. Scale 1:1000000] Instruktsiia po sestavleniiu i podgotovke k izdaniyu gosudarstvennoi geologicheskoi karty SSSR i karty poleznykh iskopaemykh SSSR. Masshtab 1:1000000. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po geologii i okhrane nedr, 1955. 52 p., tables of symbols, maps [Microfilm] (MIRA 9:6)

1. Russia (1923- U.S.S.R.) Ministerstvo geologii i okhrany nedr.  
(Geology--Maps)

*LIBROVICH, L.S.*

KRISHTOFOVICH, A.N., redaktor [deceased] SPIZHARSKIY, T.N., redaktor;  
BELYAYEVSKIY, N.A., redaktor; VADRANYANTS, L.A., redaktor;  
ZAITSEV, I.K., redaktor; KRASNOM, I.I., redaktor; KULIKOV, M.V.  
redaktor; LABAZIN, G.S., redaktor; LIBROVICH, L.S., redaktor;  
LUR'YE, M.L., redaktor; MALINOVSKIY, F.M., redaktor; NESTEROV,  
L.Ya., redaktor; NEKHOROSHEV, V.P., redaktor; SERGIYEVSKIY, V.M  
redaktor; TALDYKIN, S.I., redaktor; KHABAKOV, A.V., redaktor;  
SHABAROV, N.V., redaktor; SKVORTSOV, V.P., redaktor; KISELEVVA,  
A.A., tekhnicheskiy redaktor GUROVA, O.A., tekhnicheskiy redaktor.

[Geological dictionary] Geologicheskii slovar'. Moskva, Gos.  
nauchno-tekhn.izd-vo lit-ry po geologii i okhrane nedr. Vol.1  
(MLRA 8:10)  
A-L 1955. 402 p.  
(Geology--Dictionaries)

LIKHAREV, B.K., glavnnyy redaktor; LIBROVICH, L.S., redaktor; MODZALEVSKAYA,  
Ye.A., redaktor; HALIVKIN, D.V., redaktor; GVECHKIN, N.K., redaktor;  
ROTAY,A.P., redaktor; SPIZHARSKIY, T.N., redaktor; SKVORTSOV, V.P.,  
redaktor izdatel'stva; GUBROVA, O.A., tekhnicheskiy redaktor

[Stratigraphic dictionary of the U.S.S.R.] Stratigraficheskii slovar'  
SSSR. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po geol. i okhrane  
nedr, 1956. 1282 p. (MLRA 10:2)

1. Leningrad. Vsesoyuznyy geologicheskiy institut.  
(Geology, Stratigraphic--Dictionaries)

LIBROVICH, L.S.

Some new groups of goniatites from Carboniferous deposits of the  
U.S.S.R. Ezhegod. Vses. paleont. ob-va 16:246-273 '57.  
(MIRA 11:4)  
(Ammonoidea)

BELYAYEVSKIY, N.A., red., VERESHCHAGIN, V.N., red., KRASNYY, L.I., red., LIBROVICH, L.S., red., MARKOVSKIY, A.P., red., MUZYLEV, S.A., red., NALIVKIN, D.V., red., NIKOLAYEV, V.A., red., OVECHKIN, N.K., red., POLOVINKINA, Yu.Ir., red., ROSSOVA, S.M., red. izd-va.; SEMENOVA, M.V., red. izd-va.; BABINTSEV, N.I., red. izd-va.; GUROVA, O.A., tekhn.red.

[Geological structure of the U.S.S.R.] Geologicheskoe stroenie SSSR.

Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po geol. i okhrane nedr.

Vol. 1. [Stratigraphy] Stratigrafiia. 1958. 587 p. [Supplement]

Prilozhenie. 3 fold. maps.

Vol. 2. [Magmatism] Magmatizm. 1958. 329 p.

Vol. 3. [Tectonics] Tektonika. 1958. 383 p.

(MIRA 11:11)

1. Leningrad. Vsesoyuznyy geologicheskiy institut.  
(Geology)

LIBROVICH, L.S.

Basis for establishing the lower margin of the Carboniferous  
[with summary in English]. Sov.geol. 1 no.7:35-42 Jl. '58.  
(MIRA 11:11)

1. Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut.  
(Geology, Stratigraphic)

LIBROVICH, L.S.

Studying the principal stages in the evolution of ammonoids in the lower and middle Carboniferous for purposes of correlation [with summary in English]. Sov. geol. 1 no.8:89-94 Ag '58. (MIRA 11:11)

1. Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut.  
(Ammonoidea)

LIBROVICH L. S

ANIKEEV, N.P., glavnnyy red.; BISKE, S.F., red.; BOBYLEVSKIY, V.I., red.;  
VAS'KOVSKIY, A.P., red.; VERESHCHAGIN, V.N., red.; DRABKIN, I.Ye.,  
red.; YEVANGULOV, B.E., red.; YEFIMOVA, A.F., red.; ZIMKIN, A.V.,  
red.; LARIN, N.I., red.; LIKHAREV, B.K., red.; MENNER, V.V., red.;  
MIKHAYLOV, A.F., red.; NIKOLAYEV, A.A., red.; POPOV, G.G., red.;  
POPOV, Yu.N., red.; SAKS, V.N., red.; SEMEYKIN, A.I., red.;  
SIMAKOV, A.S., red.; TITOV, V.A., red.; SHILO, N.A., red.; EL'YANOV,  
M.D., red.; LAKUSHEV, I.R., red.: V redaktirovani prinimali uchast-  
tiye: ANDREYEVA, O.N., red.; BAIKOVSKAYA, T.N., red.; BOLKHOVITINA,  
N.A., red.; BORSUK, M.O., red.; VASIL'YEV, I.V., red.; VASILEVSKAYA,  
N.D., red.; VOL'EVODOVA, Ye.M., red.; YEVSEYEV, K.P., red.; KIPARI-  
SOVA, L.D., red.; KRASNYY, L.I., red.; KRISHTOFOVICH, L.V., red.;  
KULIKOV, M.V., red.; LIBROVICH, L.S., red.; MARKOV, F.G., red.;  
MODZALEVSKAYA, Ye.A., red.; NIKIFOROVA, O.I., red.; OBUT, A.M.,  
red.; PCHELINTSEVA, G.T., red.; RZHONSNITSKAYA, M.A., red.; SEDOVA,  
M.A., red.; STEPANOV, D.L., red.; TIMOFEEV, B.V., red.; KHUDOLEY,  
K.M., red.; CHEMEKOV, Yu.F., red.; CHERNYSHEVA, N.Ye., red..  
DEERZHAVINA, N.G., red. izd-va; GUROVA, O.A., tekhn.red.

(Continued on next card)

ANIKEYEV, N.P.—(continued) Card 2.

[Decisions of the Interdepartmental Conference on the Unified Stratigraphic Columns of the Northeastern Part of the U.S.S.R.]  
Resheniya Mezhdromstvennogo soveshchaniia po razrabotke unifitsirovannykh stratigraficheskikh skhem dlia Severo-Vostoka SSSR.  
Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po geol. i okhrane nadr,  
1959. 65 p.

(MIRA 13:2)

1. Mezhdromstvennoye soveshchaniye po razrabotke unifitsirovannykh stratigraficheskikh skhem dlia Severo-Vostoka SSSR, Magadan, 1957.  
(Soviet Far East—Geology, Stratigraphic)

LIBROVICH, L.S.

Academician Dmitrii Vasil'evich Nalivkin; on his 70th birthday.  
Sov.geol. 2 no.12:133-136 D '59. (MIRA. 13:5)

1. Vsesoyuznyy geologicheskiy nauchno-issledovatel'skiy institut.  
(Nalivkin, Dmitrii Vasil'evich 1890-)

NALIVKIN, D.V., *glav. red.*; VERESHCHAGIN, V.N., *zam. *glav. red.**; MENNER, V.V., *zam. *glav. red.**; OVECHKIN, N.K., *zam. *glav. red.** [deceased]; SOKOLOV, B.S., *zam. *glav. red.**; SHANTSER, Ye.V., *zam. *glav. red.**; KELLER, B.M., *otv. red. toma*; MODZALEVSKAYA, Ye.A., *red.*; CHUGAYEVA, M.N., *red.*; GROSSGEYM, V.A., *redaktor*; KIPARISOVA, L.D., *redaktor*; KOROBKOV, M.A., *red.*; KRASNOM, I.I., *red.*; KRYMGOL'TS, T.Ya., *red.*; LIBROVICH, L.S., *red.*; LIKHAREV, B.K., *red.*; LUPPOV, N.P., *red.*; NIKIFOROVA, O.I., *red.*; OBRUCHEV, S.V., *red.*; POLKANOV, A.A., *red. [deceased]*; RENGARTEN, V.P., *red.*; STEPANOV, D.L., *red.*; CHERNYSHEVA, N.Ye., *red.*; SHATSKIY, N.S., *red. [deceased]*; EBERZIN, A.G., *red.*; GOROKHOVA, T.A., *red. izd-va*; GUROVA, O.A., *tekhn. red.*

[Stratigraphy of the U.S.S.R. in fourteen volumes] Stratigrafiia SSSR v chetyrnadtsati tomakh. Moskva, Gosgeoltekhnizdat. Vol.2. [Upper Pre-Cambrian] Verkhniy dokembrii. Otv. red. B.M. Keller. 1963. 716 p. (MIRA 17:1)

1. Chlen-korrespondent AN SSSR (for Sokolov).

LIBROVICH, L.S.; OVECHKIN, N.K. [deceased]; DOMNICH, N.I., red.;  
BARABANOVA, T.M., tekhn. red.

[Problems and rules for the study and description of strato-  
types and key stratigraphic cross sections]. Zadachi i pra-  
vila izuchenija i opisanija stratotipov i opornykh strati-  
graficheskikh razrezov. Moskva, Gosgeoltekhnizdat, 1963. 26 p.  
(MIRA 16:10)

1. Mezhvedomstvennyy stratigraficheskiy komitet.  
(Geology, Stratigraphic)

LIBROVICH, L.S.

Facies zoning of the Urals in the beginning of the Carboniferous.  
Trudy VSEGEI 102:33-40 '64. (MIRA 18:2)

LIBROVICH, N.B.; VIMNIK, M.I.

Activity coefficients of the nonionized form of some indicators used in measuring the acidity of aqueous solutions of sulfuric acid. Dokl. AN SSSR 166 no.3:647-650 Ja '66.

(MIRA 19:1)

1. Institut khimicheskoy fiziki AN SSSR. Submitted May 24, 1965.

3/207/62/000/001/010/018  
B145/B138

AUTHORS: Istratov, A. G., Librovich, V. B. (Moscow)

TITLE: Theory of flame velocity in systems with chain reactions

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 1  
1962, 68 - 75

TEXT: Ya. B. Zel'dovich's semiquantitative theory of hot flames with chain reactions (Ref. 1: Zel'dovich Ya. B. Tsepnyye reaktsii v goryachikh plamenyakh. Priblizhennaya teoriya skorosti plameni. Kinetika i kataliz, 1961, v. II, no. 3) is elaborated and the rate of flame propagation is calculated for HCl mixtures and compared with experimental data. For the scheme of an unbranched chain:  $A + M \rightarrow 2 B + M$ ,  $A + B \rightarrow C + B$  ( $A$  initial substance,  $B$  active centers,  $M$  arbitrary molecule)  $db/dt = w_b = 2 amk_1 e^{-E_1/RT}$  and  $-da/dt = w_a = abk_2 e^{-E_2/RT}$  ( $a$ ,  $b$ ,  $m$  concentration of  $A$ ,  $B$ ,  $M$ ), and under the assumption of constant concentration of active centers in the reaction zone ( $b = b^*$ ), the following system of equations is obtained:

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S/207/62/000/001/010/018  
B145/B138

Theory of flame velocity ...

$$c_p \rho u \frac{dT}{dx} = \frac{d}{dx} \lambda \frac{dT}{dx} + qab_* k_2 e^{-E_* / RT}$$

$$\rho u \frac{da}{dx} = \frac{d}{dx} \rho D_a \frac{da}{dx} - ab_* k_2 e^{-E_* / RT}$$

$$\rho u \frac{db}{dx} = \frac{d}{dx} \rho D_b \frac{db}{dx} + 2amk_1 e^{-E_* / RT}$$

(u rate of flame propagation,  $\rho$  density,  $c_p$  specific heat,  $\lambda$  coefficient of thermal conductivity,  $D_a$  and  $D_b$  diffusion coefficients). Under the assumption that the concentration of the active centers is so small that it has no effect on the heat balance of the reaction zone, the following equations are obtained:

$$(pu)^4 = 4f_1 \left( \frac{E_2}{E_1} \right) \left( \frac{\lambda_1}{\lambda_{p1}} \right)^2 \left( \frac{c_{p1} T_f}{q a_0} \right)^4 \frac{a_0^2}{D_{a1}^2} a_0 m k_{11} k_{12} \exp \left( - \frac{E_1 + E_2}{RT_f} \right) \left( \frac{RT_f}{E_n} \right)^4 \quad (1.8)$$

$$b_*^2 = f_1 \left( \frac{E_2}{E_1} \right) a_0 m \frac{k_{11}}{k_{21}} \exp \left( - \frac{E_1 - E_2}{RT_f} \right) \quad (1.9)$$

(q heat effect of the reaction per mole A). For the scheme  $B_2 + M \xrightarrow{k_1} 2 B + M$ ,  $B + A_2 \xrightarrow{k_2} AB + A$ ,  $A + B_2 \xrightarrow{k_3} AB + B$  under the assumption that

Card 2/4

Theory of flame velocity ...

S/207/62/000/001/010/018  
B145/B138

tion of the active centers in the reaction zone was found to be low and determined only by the rate of diffusion of the active centers from the combustion products into the reaction zone. The calculation results for  $u$  agree with the experimental data from Ref. 12 (Ref. 12: Rozlovskiy A. I. Kinetika temnovoy reaktsii khlorovodorodnoy smesi. Normal'noye goreniye khlorovodorodnikh smesey. ZhFKh, 1956, v. XXX, no. 11) D. A. Frank - Kamenetskiy, S. B. Ratner, E. E. Nikitin, A. I. Rozlovskiy, Ya. B. Zel'dovich and G. I. Barenblatt are mentioned. There are 1 figure, 1 table, and 12 references: 10 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: Hirschfelder J. O., Bird R. B. and Spotz E. L. The transport properties for non-polar gases and gaseous mixtures. Chem. Rev., 1949, v. 44, no. 1, p. 205; Hirschfelder J. O., Bird R. B. and Spotz E. L. The transport properties for non-polar gases. J. Chem. Phys., 1948, v. 16, no. 10, p. 968.

SUBMITTED: October 14, 1961

Card 4/4

LIBROVICH, V.B. (Moskva)

Characteristic combustion rate of gunpowder of a mixed composition. PMTF no.4:33-39 Jl-Ag '62. (MIRA 16:1)  
(Gunpowder)

37387

S/020/62/143/006/020/024  
B152/B102II.5100  
II.1110

AUTHORS:

Istratov, A. G., and Librovich, V. B.

TITLE:

Calculation of the rate of normal flame propagation in hydrogen-chlorine mixtures

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 6, 1962,  
1380-1383

TEXT: On the basis of Ya. B. Zel'dovich's theory of normal flame propagation in chain reactions (Kinetika i kataliz, 2, no. 3, 305 (1961)), the authors study the combustion of hydrogen-chlorine mixtures. At the temperature of combustion ( $2500^{\circ}\text{K}$ ),  $\text{Cl}_2$ , unlike  $\text{H}_2$  and  $\text{HCl}$ , dissociates almost entirely and releases a chain reaction:  $\text{Cl}_2 + \text{X} \rightarrow 2\text{Cl} + \text{X}$ ;  $w_{\text{Cl}} = 2[\text{Cl}_2][\text{X}]k_1 \exp(-E_1/RT)$ .  $\text{X}$  is an arbitrary molecule, and  $w$  is the reaction rate. The chain reaction proceeds in the following way:  $\text{Cl} + \text{H}_2 \rightarrow \text{HCl} + \text{H}$ ;  $w_{\text{H}_2} = -[\text{Cl}][\text{H}_2]k_2 \exp(-E_2/RT)$ . Excess chlorine

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Calculation of the rate of normal ...

S/020/62/143/006/020/024  
B152/B102

continues to dissociate after the combustion of the hydrogen and forms active centers. If the equilibrium concentration  $[Cl]_{equ}$  is only reached at a large distance from the reaction zone, the small concentration  $[Cl]_m$  in the reaction zone can be calculated from the diffusion rate of the active centers in it. In this case, the temperature immediately beyond the reaction zone is higher than the theoretical equilibrium temperature, to which it only decreases at a large distance, as has been demonstrated by Ya. B. Zel'dovich and S. B. Ratner (ZhETF, 11, 170 (1941)). With chlorine excess the heat conduction and diffusion equations as used by D. A. Frank-Kamenetskiy, together with the equations for the reaction rates, yield

$$(\rho_0 u_0)^4 = 4 \left( \frac{RT_r}{E_2} \right)^2 \left( \frac{\lambda}{c_p} \right)^2 \left( \frac{c_{pr} T_r}{q [H_2]_0} \right)^2 \frac{D_{Cl,r}}{D_{H_2,r}} [Cl_2]_r [X] k_{1r} k_{2r} \exp\left(-\frac{E_1 + E_2}{RT_r}\right) \quad (4)$$

$$[Cl]_m = 2u_r^{-2} D_{Cl,r} [Cl_2]_r [X] k_{1r} \exp[-E_1/RT_r]. \quad (5)$$

Subscript r refers to combustion, and subscript o to the initial mixture; q is the heat effect of the reaction, D is the diffusion coefficient,  $c_p$  is the specific heat, and  $\lambda$  is thermal conductivity. With  $H_2$  excess

Card 2/4

S/020/62/143/006/020/024  
B152/B102

Calculation of the rate of normal ...

in the mixture one finds  
 $(\rho_0 u_0)^4 = 4f_2 \left(\frac{E_2}{E_1}\right) \left(\frac{RT_r}{E_2}\right)^3 \left(\frac{c_{pr} T_r}{q [Cl_2]_0}\right)^3 \frac{\mu_{Cl_2}}{\mu_{H_2}} \left(\frac{\lambda_r}{c_{pr}}\right)^3 [H_2]_r [X] k_{1r} k_{2r} \exp\left(-\frac{E_1 + E_2}{RT_r}\right)$  (6) and

$[Cl]^2_m = f_2 \left(\frac{E_2}{E_1}\right) \frac{RT_r}{E_2} \frac{c_{pr} T_r}{q [H_2]_r \mu_{Cl_2}} [Cl_2]_0 [X] \frac{k_{2r}}{k_{1r}} \exp\left(-\frac{E_1 - E_2}{RT_r}\right),$  (7).

$m$  is the molecular weight, and  $f_2(E_2/E_1) \approx (\sqrt{\pi}/2)(E_2/E_1)^{3/2}$ . For stoichiometric combustion one obtains

$(\rho_0 u_0)^4 = 4f_1 \left(\frac{E_2}{E_1}\right) \left(\frac{RT_r}{E_2}\right)^4 \left(\frac{\lambda_r}{c_{pr}}\right)^4 \frac{x_r^2}{D_{H_2,r} D_{Cl_2,r}} \left(\frac{c_{pr} T_r}{q [Cl_2]_0}\right)^4 \times$

$\times [Cl_2]_0 [X] k_{1r} k_{2r} \exp\left(-\frac{E_1 + E_2}{RT_r}\right);$  (8)

$[Cl]^2_m = f_1 \left(\frac{E_2}{E_1}\right) \frac{D_{H_2,r}}{D_{Cl_2,r}} [Cl_2]_0 [X] \frac{k_{1r}}{k_{2r}} \exp\left(-\frac{E_1 - E_2}{RT_r}\right).$  (9).

The activation energy of chlorine dissociation is  $E_1 = 57,500$  cal/mole.  
 The activation energy of chlorine dissociation is  $E_1 = 57,500$  cal/mole.  
 The pre-exponential factor was calculated according to Ye. Ye. Nikitin

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Calculation of the rate of normal ...

S/020/62/143/006/020/024  
B152/B102

(DAN, 119, no. 3, 526 (1958)).  $E_2 = 6,800 \text{ cal/mole}$ ,  $k_2 = 1.32 \cdot 10^{-10} \text{ cm}^3/\text{sec.}$   
The calculated values refer to  $T_0 = 291^\circ\text{K}$  and  $P_0 = 1 \text{ atm}$  of the initial mixture. They are compared with experimental data of A. I. Rozlovskiy (ZhFKh, 30, no. 11, 2489 (1956)). Ya. B. Zel'dovich is thanked for discussions, G. I. Barenblatt for interest, and A. I. Rozlovskiy for making available data. There are 1 figure and 1 table. The most important English-language references are: J. O. Hirschfelder, R. B. Bird, R. B. Bird, E. L. Spotz, J. Chem. Phys., 16, no. 10, 968 (1948); J. O. Hirschfelder, E. L. Spotz, Chem. Rev., 44, no. 1, 205 (1949). ✓

ASSOCIATION: Moskovskiy fiziko-tehnicheskiy institut (Moscow  
Physicotechnical Institute)

PRESENTED: November 28, 1961, by Ya. B. Zel'dovich, Academician

SUBMITTED: November 20, 1961

Card 4/4

S/040/63/027/002/012/019  
D251/D308

AUTHORS: Istratov, A. G. and Librovich, V. B. (Moscow)

TITLE: On the stability of solutions in the stationary theory  
of thermal explosion

PERIODICAL: Prikladnaya matematika i mehanika, v. 27, no. 2,  
1963, 343-347

TEXT: The authors investigate the stability of solutions of the  
steady theory of thermal explosion. In general terms, this theory  
leads to the solution of the equation

$$\frac{1}{\xi^{\nu}} \frac{d}{d\xi} \left( \xi^{\nu} \frac{du}{d\xi} \right) + 2e^u = 0$$

$$\left( u = \frac{(T - T_0)E}{RT_0^2}, \quad \xi = \left[ \frac{QZE}{2kRT_0^2} \exp \left( - \frac{E}{RT_0} \right) \right]^{1/2} x \right) \quad (1.1)$$

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S/040/63/027/002/012/019  
D251/D308

On the stability of ...

The form of the partial solutions for different types of vessels is indicated, and the problem is approached by the method of small perturbances, applied to the non-steady equation of thermal conductivity. On the assumption that the non-steady problem differs only slightly from the steady, this equation is linearized. The solution is sought in the form

$$\varphi(s, \tau) = T(\tau) P(s) \quad (2.5)$$

the time dependence of the solution being defined by the factor

$$T_n(\tau) = e^{-\lambda_n \tau} \quad (2.6)$$

Card 2/3

On the stability of ...

S/040/63/027/002/012/019  
D251/D308

where  $\lambda_n$  are the eigenvalues of the Sturm-Liouville boundary-value problem. If all  $\lambda_n$  are positive, then the solution is stable, but if even one  $\lambda_n$  is negative, then it is unstable. The stability of the temperature distribution is considered for a two-dimensional vessel.  $\alpha$  is defined to be the temperature at the center of the vessel, and the solution of the temperature-distribution equation is stable for small  $\alpha$ . The argument is extended to the general case, and the equation

$$\alpha_1^* = -U_0(s_1^*) \quad (4.4)$$

for the critical value of  $\alpha = \alpha_1^*$  is derived. Some qualitative means of estimating stability are indicated. There are 2 figures.

SUBMITTED: December 3, 1962

Card 3/3

S/0207/64/000/003/0139/0144

ACCESSION NR: AP4041203

AUTHORS: Istratov, A. G. (Moscow); Librovich, V. B. (Moscow); Novozhilov, B. V. (Moscow)

TITLE: Concerning the approximation method in the theory of uneven combustion rate of a powder

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 3, 1964, 139-144

TOPIC TAGS: combustion rate, combustion stability, computer result, combustion temperature, temperature gradient

ABSTRACT: Analytical expressions for an uneven combustion rate were derived for a powder model with a combustion rate dependent only on the pressure and surface temperature gradient of the condensation phase. Instantaneous and exponential pressure variations were studied. The steady powder combustion rate was investigated for both the linear and exponential dependence on the initial powder temperature. In steady combustion the rate is determined by the initial powder temperature  $T_0$  and the pressure  $p$ , and a relation exists between  $T_0$  and the temperature gradient at the boundary of the condensation phase  $\Phi$ . Knowing this,  $T_0$  was found as a

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ACCESSION NR: APL4041203

function of  $p$  and  $\Phi$ , and the combustion rate was expressed in these parameters. Ya. B. Zel'dovich (O skorosti gorenija porokha pri peremennom davlenii. PMTF, 1964, No. 3) showed that this could also be done for uneven burning, but in this case  $\Phi$  must be determined from the solution of the thermal conductivity equation in the solid phase. The problem was worked out with the dimensionless variables; it consisted of finding functions determining the uneven combustion rate and the temperature distribution in a solid phase. This had been previously done by a computer using the approximation method of integral equations. The uneven combustion rate was studied for a linear dependence of the powder combustion rate on the initial temperature. For the purpose of illustrating the derived results, uneven combustion rates with a sharp and an exponential decrease of pressure were examined by the approximation method and compared to computer results with satisfactory agreement. Extinguishing of the powder may take place with a rather rapid decrease in the pressure, and an instantaneous decrease leads to a negative radical which is unsolvable. The final portion of the paper is devoted to the study of the uneven combustion rate with an exponential dependence of the powder combustion rate on the initial temperature. The authors thank O. I. Leypunskiy and G. I. Barenblatt for their critique and advice. Orig. art. has: 6 figures and 28 equations.

ASSOCIATION: none

Card 2/3.

"APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R000929820

ASSOCIATION: AP4041203

SUBMITTED: 06Mar64

SUB CODE: FP

NO REF SOV: 006

ENCL: 00

OTHER: 001

Card 3/3

APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R000929820C

"APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R000929820

LIBROVICH, V.B. (Moskva)

Irrition of gunpowders and other explosives. PMTF no. 6:74-79  
(MIRA 17:7)  
N-D '63.

APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R000929820C

Istratov, A. G. (Moscow); Litovtsev, V. I. (Moscow)

TITLE: On the stability of powder combustion

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 5, 1964, 38-43

TOPIC TAGS: combustion, combustion stability, solid fuel, explosive, propellant

ABSTRACT: The steady-state combustion of powder was investigated and corresponding stability criteria were established. It is assumed that in the combustion model there are two regions of combustion.

In the first region, the temperature profile of the interface during combustion are divided into three parts: the initial part of the interface, in region 1 heating starts at  $T_0$  in solid powder and increases to  $T_s$  at interface

2. Chemical reaction takes place between zones 1 and 2, changing the powder

3. These gaseous products diffuse through region 2 to the interface of

4. Some 2 represents the equilibrium temperature of the burning powder.

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Ref ID: A25152362

The equations are written under the assumption that the Lewis number is unity and the heat capacity and the transfer coefficients are constant. A set of eight boundary conditions is given at the moving surface ( $\xi = 0$ ) and in the gas, at the value ( $\xi = \xi_1$ ), satisfying the condition of stability, flow and mass conservation, and complete combustion of reacting substances. The solution of the heat conduction equation yields

$$\begin{aligned} \theta_1 &= \exp(\sigma\xi - \omega t) \quad (\nu = \nu_1(1 + \sqrt{1 + 4\nu})) \\ \theta_1' &= \nu \exp\left[\frac{\nu^2}{4}\xi + \omega t\right] - \nu^2 \exp\left[\frac{\nu^2}{4}\xi - \xi_1\right] + \omega t \\ \theta_2 &= \nu \exp\left[\frac{\nu^2}{4}\xi + \omega t\right] - \nu^2 \exp\left[\frac{\nu^2}{4}\xi - \xi_1\right] + \omega t \\ \theta_3 &= \nu \exp\left[\frac{\nu^2}{4}\xi + \omega t\right] - \nu^2 \exp\left[\frac{\nu^2}{4}\xi - \xi_1\right] + \omega t \end{aligned}$$

This, together with the eight boundary conditions, generates a set of eight linear, homogeneous algebraic equations. The following stability criteria were obtained: at  $y > 1$

$$y > 1 + \sigma/2 + \nu_1(\sigma(c+8))^{1/2}$$

and at  $y < 1$

$$\begin{aligned} y &< 1 + \sigma/2 - \nu_1(\sigma(c+8))^{1/2} \\ y &< 1 + \sigma/2 - \nu_1(\sigma(c+8))^{1/2} \end{aligned}$$

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COLLECTION NR: AP5002862

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where

$$\frac{z_1 \theta_i}{\sigma} = \frac{E_1 (T_i - T_0)}{2 R T_0^2} \frac{c_{pl}}{c_{pe}}, \quad \sigma = \frac{z_1}{z_1 c_p} = \frac{E_1 T_0^2}{E_i T_i^2} \frac{c_{pl}}{c_{pe}}$$

The above criteria differ from

defined by Ya. B. Zel'dovich's teoriya pereskvy v zivuchatykh  
v. Sh. Siperim. i teor. fiz. 1942, t. 12, No. 11-12) by the appearance  
of an additional governing parameter. For actual powders  $c \neq C_{pe}$ . The  
authors are grateful to G. I. Baranovskii, Ya. B. Zel'dovich, and G. I. Bojarskiy  
for organizing the problem and evaluating the work. Orig. art. Russ. No formulas  
and 2 figures.

3

(04)

ASSOCIATION: none

SUBMITTED: 06Mar64

ENCL: 01

SUB CODE: FP,TD

NO REF SOV: 006

OTHER: 000

ATD PRESS: 3169

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L 22214-65

ACCESSION NR: A15002862

ENCLOSURE: 01

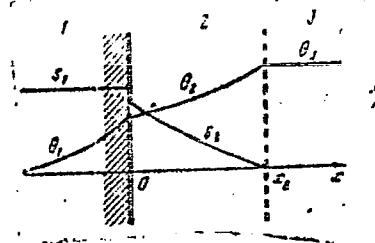


Fig. 1. Temperature distribution  
during combustion

Card 4/4

I-20465-66 EWT(1)/EWT(1)/EWP(F)/T/ETC(m)-6 MJ/VE

ACC NR: AP6009050

(A)

SOURCE CODE: UR/0207/66/000/001/0067/0078

54

6

AUTHOR: Istratov, A. G. (Moscow); Librovich, V. B. (Moscow)

ORG: none

TITLE: The stability of propagation of spherical flames

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 1, 1966, 67-78

TOPIC TAGS: combustion, combustion stability, combustion instability, flame, spherical flame

ABSTRACT: The discrepancy between the critical Reynolds number value of unity predicted by L. D. Landau's theory and the much higher experimental values has been studied by several Soviet researchers. Experiments by Shchelkin, Zeldovich, and Rozlovskiy yielded values ranging from  $10^4$  to  $10^6$  for  $Re_{cr}$ . In the present study, a theoretical analysis of the critical Reynolds number was made for spherical flames under the assumption that the flame front is a discontinuity which moves relative to the gas at a velocity which in general depends on the curvature of the flame surface. The analysis was carried out in two steps: first, the stability was analyzed with respect to the first harmonic, while assuming that the flame speed is independent of the perturbation (Landau's concept); then, the stability with respect to higher harmonics was analyzed. For this case, the effect of the perturbation on the flame speed is considered. In the first case, using Landau's approach, which does not

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ACC NR: AP6009050

consider the transport phenomena, it was found that instability will be induced only by short wave perturbations. However, for short wave perturbations the effect of the transport phenomena, which may lead to attenuation, must be considered and therefore the above result is inconclusive. In the second case, all perturbations decrease and the individual harmonics are attenuated at a different rate. One harmonic passes through a minimum and then the other harmonics begin to grow and instability develops. In general, the analysis showed that the critical Reynolds number of spherical flames is considerably higher than that of flat flames, i.e., spherical flames are more stable. This is demonstrated by a numerical example. The high experimental  $Re_{cr}$  values must be attributed to the characteristics of the spherical flame as well as to nonlinear stabilizing effects. Orig. art. has: 58 formulas [PV]

SUB CODE: 21/ SUBM DATE: 18Aug65/ ORIG REF: 009/ OTH REF: 002/ ATD PRESS:

4222

Card 2/2 M95

L 29705-66 EWP(m)/EWT(1)/EWT(m) WE/NW/JW  
 ACC NR: AP6015078

SOURCE CODE: UR/0020/66/168/001/0043/0046

75  
69  
B

AUTHORS: Istratov, A. G.; Librovich, V. B.

ORG: Institute of Chemical Physics, Academy of Sciences SSSR (Institut  
khimicheskoy fiziki Akademii nauk SSSR)

TITLE: Hydrodynamic stability of spherical flames

SOURCE: AN SSSR. Doklady, v. 168, no. 1, 1966, 43-46

TOPIC TAGS: hydrodynamic stability, laminar flame, Reynolds number, gas combustion,  
~~hydrodynamics~~

ABSTRACT: The hydrodynamic stability of spherical flames is analyzed. The amplitude of the flame perturbation  $f$  as a function of time  $t$  is

$$f = \text{const} \cdot \left(\frac{v_s}{\mu}\right)^n \exp \left[ \frac{\omega c + d}{2\omega + c - 1} \frac{\mu}{v_s} t \right],$$

where it is assumed that the flame velocity changes at the curved front and

$$v_s = u_n/a, \quad c = \frac{an(n+1)(2n+1)}{n+2n+a}, \quad d = c(n+1).$$

UDC: 536.463

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ACC NR: AP6015078

6

For  $\omega > 0$ , the above equation attains a minimum value for each  $n$  at different times. This time  $\zeta$  is shown to depend on the Prandtl number of the cold gas, the Reynolds number, and the parameter  $\lambda$  which is a coefficient of proportionality between  $\mu$  and the flame width, or  $\zeta = \frac{PrRe}{\lambda}$ . It is shown that the continuous increase in the perturbation wavelengths at the surface of combustion can increase the original Reynolds number by two orders-of-magnitude. A numerical example is given to illustrate this point. In conclusion the authors express their thanks to Ya. B. Zel'dovich for the formulation of the problem and its evaluation, to G. I. Barenblatt, O. I. Leypunskiy, and Ya. K. Troshin for valuable remarks. This paper was presented by Academician Ya. B. Zel'dovich on 18 August 1965. Orig. art. has: 7 formulas and 4 figures.

SUB CODE: 20/ SUBM DATE: 18Aug65/ ORIG REF: 008/ OTH REF: 002

Card 2/2 CC

L 34973-66 EWT(1)/EWT(m)/T WW/JW/JWD/WE  
ACC NR: AP6022523 SOURCE CODE: UR/0040/66/030/003/0451/0466 4.2  
AUTHOR: Istratov, A. G. (Moscow); Librovich, V. B. (Moscow) 25  
ORG: none  
TITLE: The effect of transport processes on the stability of a flat flame front 2  
SOURCE: Prikladnaya matematika i mehanika, v. 30, no. 3, 1966,  
451-466  
TOPIC TAGS: combustion, combustion stability, combustion theory  
ABSTRACT: In his previous analysis of flame stability, L. D. Landau (Zh. eksperim. i teor. fiz., 1944, v. 14, no. 6.) assumed that the Reynolds number of the perturbation is infinitely large and the thickness of the flame front, infinitely thin. In the present study, it was assumed that the Reynolds number is large but not infinite, and the following effects were taken into consideration: 1) the effects of the flame front curvature on the diffusion process, the thermal conductivity, and the viscosity at the flame front; 2) changes in the reaction rate caused by temperature fluctuations; 3) the effect of the finite width of the flame front; 4) changes in the density of the combustion products behind the flame front caused by temperature fluctuations;  
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L 34973-66

ACC NR: AP6022523

and 5) the effect of viscosity on the gas motion outside the flame. An equation was derived for the critical Reynolds number in terms of the ratios of the densities of the hot and cold gases, the Prandtl number, the ratio of the thermal conductivity to diffusivity, and the dimensionless activation energy. The effects of these individual factors on flame stability is discussed. In general, the results showed that transport processes have a stabilizing effect. The authors thank G. I. Barenblatt and Ya. B. Zel'dovich for formulating and discussing the problem and O. I. Leypunskiy and V. I. Yagodkin for their valuable remarks. Orig. art. has: 47 formulas and 3 figures. [PV]

SUB CODE: 21/ SUBM DATE: 18Jan66/ ORIG REF: 007/ OTH REF: 009  
ATD PRESS: 5029

Card 2/2

JS

DOMINIKOVSKIY, V.N.; LIBROVICH, V.L.

Regularities in the distribution of Ordovician phosphorites in the  
southern Siberian Platform. Zakonom. razm. polezn. iskop. 2:209-  
220 '59. (MIRA 15:4)

1. Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut  
Ministerstva geologii i okhrany nedor SSSR.  
(Siberian Platform--Phosphorites)

LIBROVICH, V. L., Cand Geol-Mineral Sci -- (diss) ~~Химагниты~~  
"Petrology of the Ordovician phosphorus-containing deposits in  
the Irkutsk amphitheater." Len, 1957. 20 pp. (Min<sup>er</sup> Geology and  
~~Советский~~ of Mineral Resources USSR, All-Union Sci Research Geol Inst  
VSEGEI), 100 copies. (KL, 9-58, 114)

- 34 -

LIBROVICH, V.L.

Cycles in middle Ordovician phosphorite deposits in the southern part of the Siberian Platform. Top. geomorf. i geol. Bashk. no.1: 101-112 '57. (MIRA 11:4)  
(Siberian Platform—Geology, Stratigraphic)

~~DOMINIKOVSKIY~~ LIBROVICH, V.L.

DOMINIKOVSKIY, V.N.; LIBROVICH, V.L.

Types of shallow-water phosphorite deposits in the middle Ordovician  
of the Irkutsk amphitheater. Razved.i okh.nedr 23 no.8:6-10 Ag '57  
(MIRA 10:11)

1. Vsesoyuznyy geologicheskiy nauchno-issledovatel'skiy institut.  
(Irkutsk Province--Phosphorites)

L10320V1C17/V-L.

20-4-32/52

AUTHORS: Dominikovskiy, V. N., and  
Librovich, V. L.

TITLE: On the Geochemical Characterization of the Ordovician  
Phosphorites of the Irkutsk Amphitheatre (K geokhimicheskoy  
kharakteristike fosforitov ordovika Irkutskogo amfiteatra).

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 4, pp. 658-660 (USSR)

ABSTRACT: In 1955-1956 the authors studied the Ordovician sediments  
of the area mentioned in the title above. In 107 samples  
the proportions of accessory elements were stated by means  
of approximative spectrum analysis. By that it was found out  
that most minerals contained Ti, V, Cr, Mn, Ni, Cu, Y and  
Zr in "Klark" quantities ("Klarkovyye kolichestva"). Often  
Co, Ga, Sr, Ba, and Pb were found, and rarely also Be, Sc,  
Mo, and Sn. The presence of Ag and Th was sporadic. In the  
sediments mentioned above there are 5 types of phosphorites:  
1) shell-stone phosphorites with many lingula shells and  
their fragments (up to 13,06 % P<sub>2</sub>O<sub>5</sub>), 2) ferrophosphorous  
containing concretions with elements of the rare earths;  
these are rare small (1-5 centimeters) brown contractions  
(up to 8,38 % P<sub>2</sub>O<sub>5</sub>), 3) detritus granular phosphorites

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phosphorites consisting of finest (0,25-0,5 millimeters) fragments of lingula shells, 4) phosphorite conglomerates of partly rounded dints of phosphorite containing sand (up to 9,96 % P<sub>2</sub>O<sub>5</sub>), 5) phosphatelike ferruginous oolitic minerals, where oolites with coverings alternatingly containing phosphate and iron are enclosed in a ferruginous loamy mass (up to 32 % Fe<sub>2</sub>O<sub>3</sub> and 1,58 % P<sub>2</sub>O<sub>5</sub>). Table 1 shows that all these types contain increased quantities of several elements. Moreover table 1 shows: 1. Enrichment with Sc, V, Mn, Cu, Sr, Y, La, Ce, and Pb can be observed in phosphatic minerals and in some minerals of red color ("krasnotsvetnyy"), but not in those of grey color ("seotsventyye"). 2. Of the mentioned mineral types each one differs from the other by certain peculiarities in the concretion of these elements. 3. The group of brown phosphatic minerals distinguishes itself by the deficient enrichment with Cu and Pb. In this respect it is related to the red colored minerals, but not to the grey phosphorites which are enriched with Cu and Pb and sometimes contain Ag. 4. In the brown ferruginous phosphatic concretions maximum percentages of elements of rare earths can be found. From the number of other elements only V is

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distinctly concentrated here, contrary to the other types.  
5. The detritus granular phosphorites do not offer such a  
high proportion of the elements of rare earths, but of other  
elements. For comparison several samples of phosphorites  
from museum collections were analyzed. Thus could be ob-  
served that the Ordovician phosphorites are more enriched with  
accessory elements than several others. Moreover the  
informations thus acquired show that one of the most essential  
conditions of this concentration were the missing or imper-  
fectedly developed reduction processes in the sediments during  
the diagenesis. Two processes lead to the mentioned  
enrichment: 1. the concentration of the rare earths in  
phosphatic concretions which - as is well known - arise from  
oxydative surroundings, and 2. the adsorption of these  
elements by ferric hydrates of the brown and red sediments,  
where reduction phenomena play only an unimportant part.  
When both processes were working at the same time extremely  
enriched formations arose (type 2). Cu and Pb were  
concentrated in grey phosphorites, most probably because  
under reductive conditions they form hardly soluble

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combinations. In this respect Mn remains neutral. The authors did not succeed in finding out the reasons for the fact that V is concentrated in the concretions of type 2 only. There are 1 table, and 4 references, 3 of which are Slavic.

ASSOCIATION: All -Union Scientific Institute for Geological Research  
(Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy  
institut).

PRESENTED: July 4, 1957, by A. G. Betekhtin, Academician

SUBMITTED: July 1, 1957

AVAILABLE: Library of Congress

Card 4/4

DOMINIKOVSKIY, V.N.; LIBROVICH, V.L.

Ordovician formations in the Irkutsk amphitheater and their  
phosphorite potential. Sov.geol. 2 no.4:126-132 Ap '59.  
(MIRA 12:7)

1. Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut.  
(Irkutsk Province--Phosphorites)

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Origin of the basic forms of carbonaceous cementation of Aptian  
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'60. (MIRA 14:9)  
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Syngenetic carbonate cementation of some sandy sediments of the  
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DOMINIKOVSKIY, V.N.; DRAGUNOV, V.I.; LIBROVICH, V.L.

Facies characteristics of phosphorite sediments in the Siberian  
Platform. Sov.geol. 5 no.9:113-121 S '62. (MIRA 15:11)

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(Siberian Platform--Phosphorites)

LIBROVICH, V.L.

Structural cycles of carbonate formations. Inform.abor. VSEGEI  
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Study of the Aptian and Albian paleogeography in the  
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with recent conditions of sedimentation. Trudy VSEGEI 72:46-56  
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'62.

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revealed by the studies of sediments in the Kara-Tau.  
Trudy VSEGEI 72:154-160 '62. (MIRA 15:9)  
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Types of Apt and Alba rocks of the western Kopetdag and  
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'63. (MIR 17:7)

BASKOV, Ye.A.; KLIMOV, G.I.; LIBROVICH, V.L.

Genetic type of Lower Cambrian phosphate manifestations in the  
Yudoma Valley (Eastern Siberia). Min. syr'e no. 10:51-54 '64.  
(MIRA 18:3)

YANOV, E.N.; STRAKHOV, N.M.; KRASHENNIKOV, G.F.; ARUSTAMOV, A.A.; GEYSLER, A.N.; GRAMBERG, I.S.; LIBROVICH, V.L.; MIKHAYLOV, B.M.; NEKRASOVA, O.I.; PISARCHIK, Ya.K.; POLOVINKINA, Yu.I.; TATARSKIY, V.B.; SHUMENKO, S.I.

Reviews and discussions. Lit. i pol. iskop. no. 6:85-89 and 91-119  
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(MIRA 18:12)

1. Vsesoyuznyy nauchno-issledovatel'skiy geologicheskiy institut, Leningrad. (for Yanov). 2. Geologicheskiy institut AN SSSR, Moskva. Submitted July 12, 1965 (for Strakhov). 3. Moskovskiy gosudarstvennyy universitet (for Krashennikov). 4. Kazakhskiy nauchno-issledovatel'skiy institut mineral'nogo syr'ya, g. Alma-Ata (for Arustamov).

LIBOVICKY, S.

An instrument for cutting crystallographic sections. Cs cas fys 11  
no. 6:493-494 '61.

1. Fyzikalni ustav, Ceskoslovenska akademie ved, Praha.

(Crystallography)

- 00711-65 EFP(c)/EWP(z)/ZWP(e)/ZWP(b)/D/ZAN(d)/ZWP(t) Pr-a/Pad IJP(c) NM/

REF ID: A6296/0299

AUTHOR: Libshits, B. G.; Khalin, L. A.

ABSTRACT: How the quenching temperature affects the fall-off in permeability in perm-alloys

SOURCE: Fizika metallov i metallovedeniye, v. 19, no. 2, 1965, 296-299

TOPIC TAGS: permeability, nickel alloy, hardening method, permalloy, electrical resistance

ABSTRACT: The purpose of this work was to explain the part played by the excess carbon in the fall-off in permeability of perm-alloys during annealing. It is shown that the fall-off in permeability is determined by the diffusion of carbon in the atmosphere, which is held in the perm-alloys holding were quenched in water. Permeability is affected if the temperature of annealing is sufficiently high, thereby hindering the diffusion of carbon in the atmosphere.

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ACCESSION NR: AP5006338

permeability, the measurement field (0.005 oersted) was switched off every 5 minutes. Before measuring the value of permeability, the specimens were demagnetized in a variable field with attenuating amplitude (from 9 oersteds). The resistance was measured potentiometrically. The fall-off in permeability for N79M4 alloy at 180° C after quenching from 700, 800, and 900° C is shown in Fig. 1 of the Enclosure. The permeability  $\mu_{0,005}$  at 180° C decreases as  $T_q$  increases with an increase in  $T_q$ , the fall off in  $\mu_{0,005}$  takes place more rapidly. When  $T_q = 900$ ° C,  $\mu_{0,005}$  drops for 10 minutes after the magnetic field is removed. Similar results were obtained for N79 alloy. The time dependence of  $\mu_{0,005}$  for this alloy at 180 and 230° C after quenching from 500, 700 and 900° C is shown in Fig. 2 of the Enclosure. The permeability and activation parameters of N79 and N79M4 after quenching from various temperatures are shown in table 1 of the Enclosure. Orig. art. has: 2 figures and 2 tables.

ASSOCIATION: Moskovskiy institut stali i spalov (Moscow Institute of Steel and Alloys)

Card 2/6

ZSIRNOV, N.I. [Zhirkov, N.I.], a muszaki tudomanyok kandidatusa;  
KROLJ, L.B. [Krol', L.B.] a muszaki tudomanyok kandidatusa;  
LIBSIC, E.M. [Libshits, E.M.], mernok; RABKIN, Ju.I. [Rabkin,  
Yu.I.], mernok

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LIBSON, I. L., kand. med. nauk (Leningrad)

Causes of temporary lowered diuresis following gastric resection.  
Khirurgija no.4:120-126 '62. (MIRA 15:6)

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(STOMACH—SURGERY)

LIBSON, I.L., kand. med. nauk (Leningrad)

Changes in uropoiesis related to gastric resection. Khirurgia  
40 no.8:70-77 Ag '64.  
(MIRA 18:3)

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1. Iz radioginekologicheskogo (zav. - kand.med.nauk A.A.Gabelov) i rentgenodiagnosticheskogo (zav. - doktor med.nauk K.B.Tikhonov) otdelov TSentral'nogo nauchno-issledovatel'skogo rentgeno-radio-logichestskogo instituta Ministerstva zdravookhraneniya SSSR ( direktor - kand.med.nauk Ye.I.Vorob'yev).

SEGALIN, V.G., kand.tekhn.nauk; LOTOTSKIY, P.V., inzh.; LIBSON, S.I.,  
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(Liquid level indicators)

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no.12:66 D '65.

1. Iz ortopedo-travmatologicheskogo otdeleniya (zav. .. B.N.  
Libster) 2-iy gorodskoy bol'nitsy Luganska (glavnnyy vrach - A.T.  
Chumakova). Adres avtorov: Lugansk, ul.Frunze, d.106, 2-ya  
gorodskaya bil'nitsa. Submitted March 17, 1965.

(MIRA 19:1)

"APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R000929820

LIBSTER, L.D.

Sandblasting core machines. Biul.tekh.-ekon.inform. no.4:83-88 1983.  
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CIA-RDP86-00513R000929820C

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The T-16 self-propelled chassis. Biul.tekh.-ekon.inform. no.8:  
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The DT-20V tractor. Biul.tekh.-ekon.inform.Gos.nauch.-issled.inst.-  
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(Clutches (Machinery)) (Tractors--Transmission devices)

LIBTSIS, S.Ye., inzh.; VASERNIS, A.I., inzh.

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Calculating the elements of the plastic bushing of a sleeve bearing.  
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(MIRA 17:11)

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[Construction and operation of the T-16 automotive chassis]  
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LIBURAVIN, Ya.G.

Fish fat enema in dysentery. Vopr. pediat. 20 no.6:20-22 Nov-Dec 1952.  
(CLML 23:4)

1. Of the Department of Faculty Pediatrics (Head -- Prof. B. I. Gurvich),  
Gor'kiy State Medical Institute and of the Municipal Children's Clinical  
Hospital (Head Physician -- L. M. Khidekel').

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CIA-RDP86-00513R000929820

GURSKII, A.F., inzh.; LIBUBER, Yu.S., inzh.

Reinforced-concrete oscillating supports under pipelines.  
From stroi. 41 no.5:32-34 My '64. (MIRA 18:11)

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L 32723-66 EWT(1)/EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6020197

SOURCE CODE: UR0056/66/050/006/1445/1457

46

41

3

21

AUTHOR: Neganov, B.; Borisov, N.; Liburg, M.

ORG: [Neganov] Joint Institute of Nuclear Research (Ob'yedinennyj institut yadernykh issledovanij); [Borisov, Liburg] Moscow State University im. M. V. Lomonosov (Moskovskiy gosudarstvennyj universitet)

TITLE: Method of obtaining infralow temperatures, based on the dissolution of  $\text{He}^3$  in  $\text{He}^4$

SOURCE: Zh ekspres i teor fiz, v. 50, no. 6, 1966, 1445-1457

TOPIC TAGS: liquid helium, low temperature phenomenon, cryogenic liquid cooling, cryogenic refrigerator

ABSTRACT: The method described was originally proposed by London, Clarke, and Mendoza (Phys. Rev. v. 128, 1992, 1962 and earlier) and is based on the use of the latent heat of dissolution of liquid  $\text{He}^3$  in  $\text{He}^4$ . The refrigeration cycle is produced by continuously separating the two components at a higher temperature. The heat-transfer circuit is shown in Fig. 1 and the mechanics of separating and recirculating the  $\text{He}^3$  is shown in Fig. 2. The authors review the theory of the method, describe the continuous dissolution and circulation, present thermodynamic calculations of the cooling capacity of the equipment, and present a description of the complete apparatus and of the results. A temperature of 0.1K can be maintained with a heat supply of 1800 erg/sec and with  $\text{He}^3$  circulation of  $1.84 \times 10^{-4}$  mole/sec. In the absence of external heat supply the temperature of the solution can be maintained at ~0.056K. If

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L 32723-66

ACC NR: AP6020197

the ambient conditions do not change, the temperature can be maintained constant within  $\sim 0.001\text{K}$ . Later experiments, based on data on the solubility of  $\text{He}^3$  at  $\sim 0.01\text{K}$  (A. C. Anderson et al. Phys. Rev. Lett. v. 16, No. 7, 1966), stimulated the construction of a larger heat exchanger, yielded temperatures down to  $0.025\text{K}$ , and made possible a temperature of  $0.1\text{K}$  to be maintained at  $1300 \text{ erg/sec}$  supply. The authors thank Professor V. P. Dzhelepov for an opportunity to perform the work, L. B. Perenev for participating in the first experiments, N. I. Kvitkov and F. A. Nikolayev for preparing the vital units of the apparatus, and the staff of the cryogenic laboratory of OIYaI for continuously supplying liquid helium under difficult conditions. Orig. art. has: 6 figures and 8 formulas.

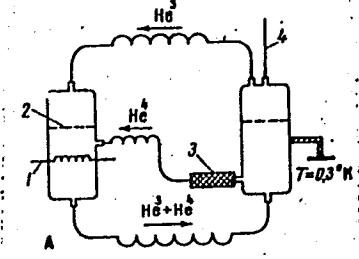


Fig. 1. Diagram of experiment on heat transfer between baths A and B by continuous solution of  $\text{He}^3$  in  $\text{He}^4$ . 1 - Heater, 2 - phase separation boundary, 3 - superfluid filter, 4 - capillary to fill the system

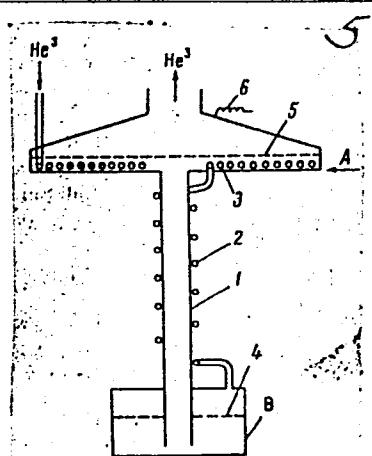


Fig. 2. Schematic diagram of apparatus

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Card 2/2 JS 5025 [02]